



Capture the energy ⚡ Release the potential

San Joaquin Renewables (“SJR”): Carbon Negative Renewable Natural Gas via Gasification of Ag Waste

tcbiomass conference

April 20, 2022

Kenton Guilbert presenting on behalf of Jerod Smeenk

Presentation Topics

- **Frontline BioEnergy's Technology**
- **SJR Project Highlights**
 - **BioEnergy with Carbon Capture and Storage (“BECCS”)**
 - **Current Status and Next Steps**
- **Project Development**
 - **Challenges**
 - **Lessons Learned**

About Me

- **Master of Science, Carnegie Mellon (but not really)**
- **Renewable Energy Experience**
 - **12 years with Center T Advisors**
 - **CFO of Solar Energy Infrastructure Venture**
 - **Multiple Financings**
- **Relationship with Frontline BioEnergy spans 3+ years**

Frontline BioEnergy – Fueling the Energy Transition™

- **Technology & project development firm founded in 2005**
- **Owns and licenses proprietary pressurized gasification and gas clean-up technology**
 - TarFreeGas® patented fluidized bed converter:
 - Pressurized bubbling and fast-fluidization bed designs
 - Up to 99% tar conversion
 - Air or oxygen/steam gasification
 - PMFreeGas® patented high efficiency pressurized gas filtration:
 - ~99.999% of particulate matter: <math><2 \text{ mg/Nm}^3</math>
- **Sub-license for auto-thermal pyrolysis technology from Iowa State University**

Frontline BioEnergy – Fueling the Energy Transition™

• Projects

- Partner with developers and EPC firms to deliver an integrated waste management, energy, fuel, chemical, and/or renewable product solution
- Chippewa Valley Ethanol Company: 75 tpd as-operated (expandable to 300 tpd) biomass-to-boiler fuel plant in Minnesota
- Providing technology license and engineering services to a major biofuel project in the western U.S.
- Providing technology license and engineering services to a renewable natural gas project in Canada
- Stine Seed Farms: EPC of a 50 tpd biomass pyrolysis demonstration plant

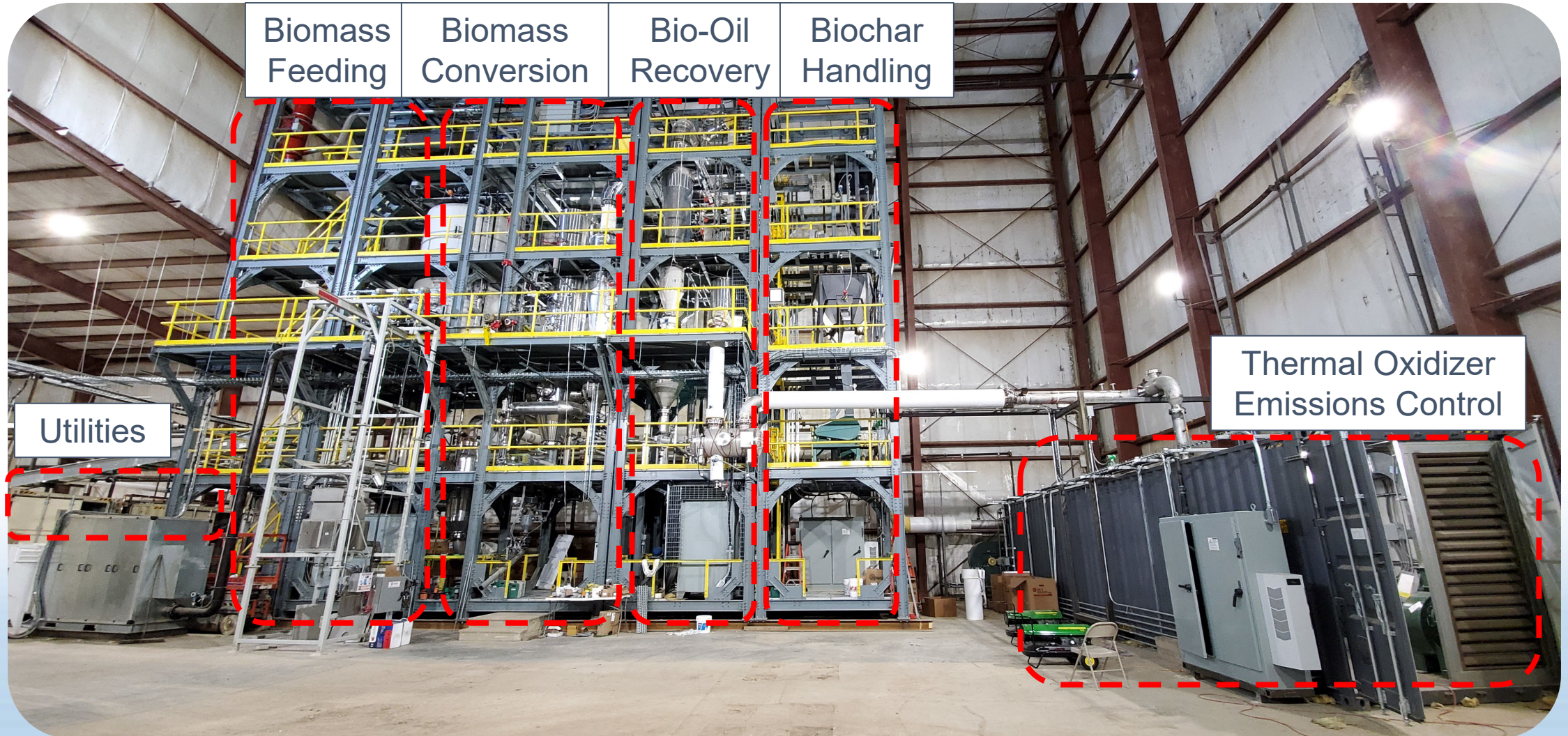
CVEC Gasifier using PMFreeGas®



Located at Chippewa Valley Ethanol Company in Benson, MN

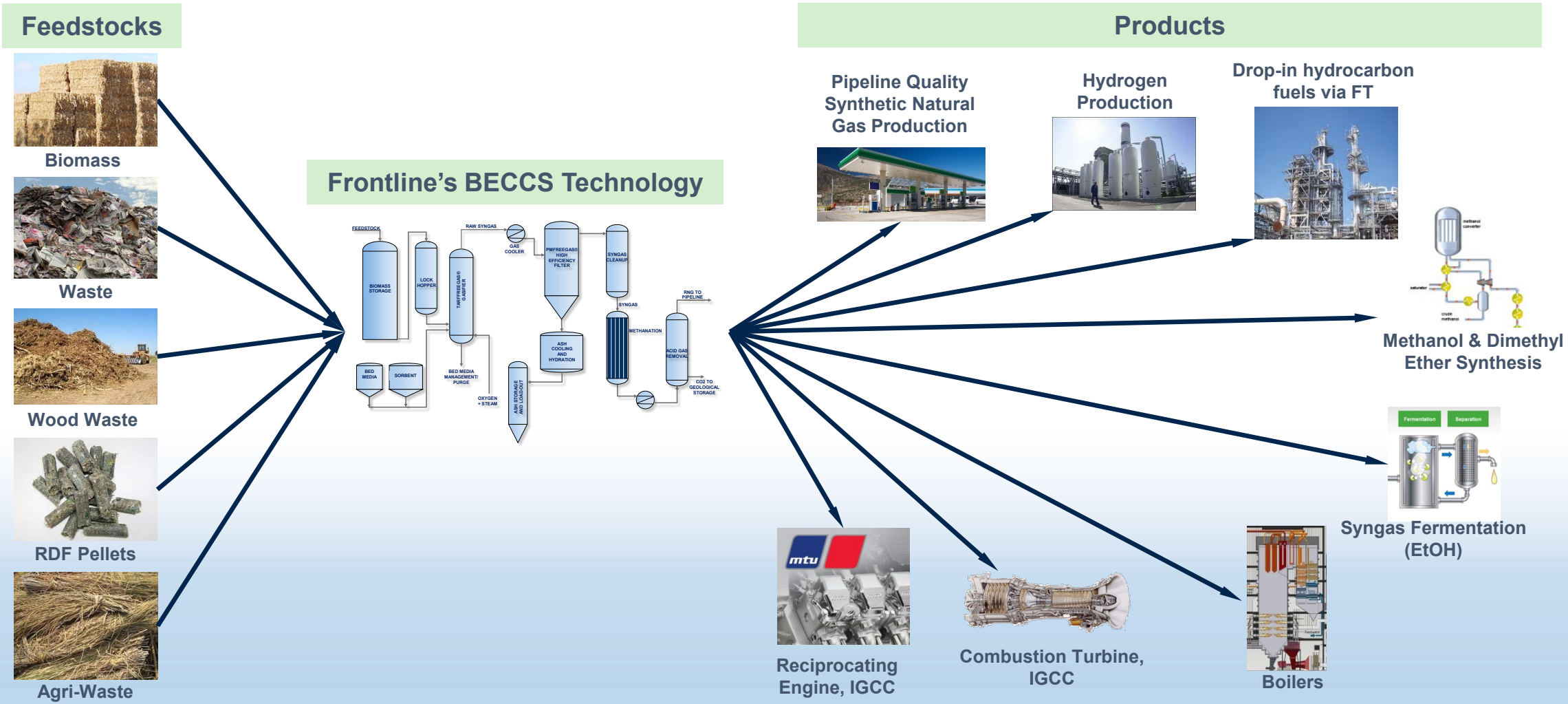
Phase 1: 75 TPD input (12.5 MW_{th})

Stine Seed Farms 50 tpd Pyrolysis Plant



Frontline Offers a Platform Gasification Technology

Enormous Flexibility: BECCS Technology is easily adapted to a very wide range of feedstocks and products, including:





- **Frontline is leading development**

- Produce approximately 10-million scf of RNG for export per day
- \$165 million of project equity secured
- Detailed engineering underway
- Permits submitted for agency review
- Pilot plant testing later this year





- **Frontline BING™ process**
Biomass-Into-Natural Gas
- **Produce RNG with a carbon intensity of -115 gCO₂e/MJ**
- **Will be one of the first BECCS projects in CA**
- **Will create 125 jobs in an economically depressed region**
- **Air quality benefit equivalent to eliminating the NO_x emissions from 2,400 diesel trucks**



Converting Orchard Residue into Renewable Natural Gas Motor Fuel

San Joaquin Renewables, LLC will convert unwanted ag residues into renewable CNG—one of the cleanest transportation fuels on the market today.

The plant will be located near McFarland, California. Start-up is projected in 2021.



ENVIRONMENTAL IMPACTS

Biomass materials will be converted into a high-value, low-carbon transportation fuel for trucks, busses, and heavy-duty vehicles.

- Renewable compressed natural gas (CNG) produced by San Joaquin Renewables reduces emission from trucks and buses by 90% compared to diesel fuel.
- Renewable CNG can have lower emissions than electric vehicles
- Renewable CNG can improve the San Joaquin Valley air quality by eliminating open burning and by providing a carbon-negative fuel.
- **Renewable CNG is the cleanest motor fuel available!**



ECONOMIC IMPACTS

- San Joaquin Renewables' conversion of ag materials to CNG will increase profitability of local almond and pistachio producers.
- San Joaquin Renewables will create 48 direct jobs at the plant and dozens more indirect jobs.
- San Joaquin Renewables will employ hundreds of workers during plant construction.



"Despite significant efforts, the South Coast and San Joaquin air basins still experience some of the worst air quality in the nation."

—Alexis Strauss
Acting EPA 9 Administrator

"San Joaquin Renewables has the best approach I've seen for converting Setton Farms' pistachio shells into a valuable product."

—Jeff Gibbons
Grower Relations Manager

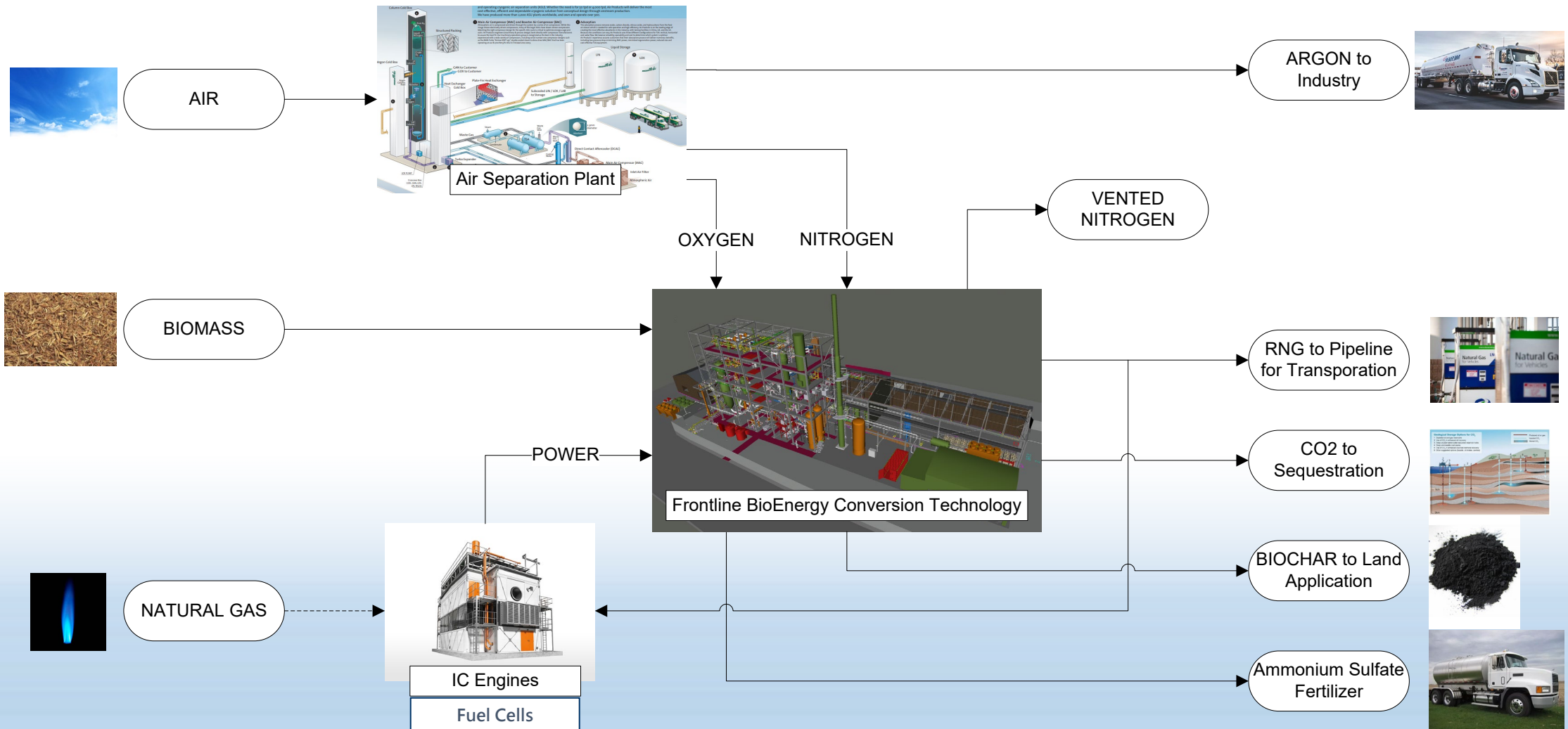
LOCAL FACILITY LOCAL IMPACT

The air quality and biomass problems require a local response. This plant, envisioned to be the first of many, provides a local solution. A goal of San Joaquin Renewables is to be one of the best neighbors to the residents of the San Joaquin Valley.



(661) 977-0210 • info@sjrgas.com
www.sjrgas.com

Frontline's BING™ Process





San Joaquin Renewables

NATURAL GAS FROM BIOMASS

• Annually the project will

- consume 400,000 tons/year of ag waste
 - 320,000 dry tons/yr of orchard wood waste
 - 80,000 dry tons/yr of nut shells
- consume no water
- produce 29 million gasoline-gallon equivalents of pipeline-quality renewable natural gas (RNG)
- produce ammonium-sulfate fertilizer
- produce 50,000 tons/year of biochar
- produce some liquid argon and nitrogen using renewable power
- safely store approximately 400,000 tons/year of CO₂ in an EPA Class VI geologic sequestration well





• Important Milestones

(from the perspective of the investor)

- Technology validated
- Site secured near McFarland, CA
- Long term feedstock contracts signed
- U.S. EPA D3 RIN pathway approved May 2020
- Long term RNG offtake contracts signed
 - 5-million scf/day already contracted
 - in discussions for remaining volume
- EPA Class VI sequestration well permit submitted for agency review





Capture the energy ⚡ Release the potential

Thank you!

Frontline BioEnergy, LLC
1521 West F Avenue
Nevada, IA 50201
515-292-1200
www.frontlinebioenergy.com